Research on Interaction of Shopping Websites for Elderly People Based on User Experience

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Abstract. The convenience of online shopping has an important impact on the change of shopping ways for the elderly. This study is based on the decline of cognitive ability of the elderly and the neglect of their shopping experience needs of the elderly in the interactive design of shopping websites. The aim of the study is to improve the experience of the elderly, and the speed of discovery browsing speed and reduce fatigue for them. In this study, 10 volunteers aged 60–65 were selected as the subjects to conduct visual flow analysis on the home pages of three shopping websites under the condition of undifferentiated testing. Participants were interviewed in depth and accessible data were collected for further analysis. The result is to discover the visual commonness of the old people's observation website, summarize the inconvenience of the interaction of shopping website, and put forward the application normative suggestions for three levels (information architecture, interaction framework and visualization framework). The contribution of the results will be helpful to the design of shopping websites for the elderly in the future, starting from the user experience and adapting to the psychological and physiological features of the elderly.

Keywords: Shopping websites · Elderly people · User experience · Interaction

1 The Background of the Elderly's Online Shopping

1.1 Ageing in China

According to the records of the first BRICS Conference on Ageing in 2017, the elderly population aged 60 years and over in BRICS countries accounted for 42% of the world's elderly population in 2016, reaching 400 million. According to experts, the elderly population will grow to 630 million by 2030 and 940 million by 2050, or 45% of the world's elderly population. From the analysis of the current situation, China is one of the most serious challenges of the aging problem. By the end of 2016, 230 million people in China had reached the age of 60 and above, accounting for 16.7% of the total population, and the aged population aged 65 and over accounted for 10.8% of the total population, exceeding 150 million. It is estimated that by 2050, 480 million people in China will reach the level of aging as showed in Fig. 1 [1].

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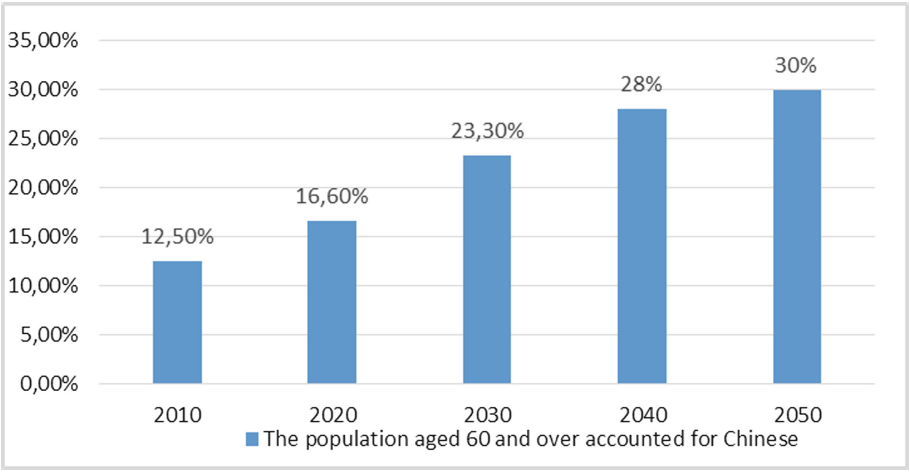

Fig. 1. Trend map of the proportion of population aged 60 and over in China

1.2 Background of Online Shopping Experience for the Chinese Elderly

The Popularity of Online Shopping. According to the survey report of China Internet Network Information Center (CNNIC), as of June 2016, the scale of Chinese netizens reached 710 million, and the penetration rate of Internet reached 51.7%, with a steady growth. According to the report of China's consumer vane, the elderly are becoming a new generation of online shopping. Whether the amount of transactions or the number of purchases, the annual ring ratio is growing at a high speed of more than 200% [2].

In the domestic shopping website market, there is almost no website interaction design for the elderly. The vast majority of older people are no different from young people in interactive design when shopping.

Physiological and Psychological Features of the Elderly. There is no significant difference in cognition and behavior pattern between the aged 60–65 and the young, but there are still some changes. However, in terms of users' visual experience on web pages, visual experience will involved in two aspects what user subjective preferences and stimulus objective presentation [3]. After sorting out the relevant knowledge, the changes of the elderly in this age group began to appear in three aspects related to online shopping.

Visual Acuity. The lens of human eyes will gradually harden with age, and the elasticity of ciliary muscles will gradually decrease. These conditions cause the decline of the visual ability of the elderly. Some small objects cannot be seen clearly. It is necessary to wear presbyopic glasses when reading newspapers and magazines to see clearly the text, and the perception of color in life will also be reduced. In addition, compared with the general population, the decline of the vision of the elderly will also lead to blurred vision movement of the elderly, which will lead to the narrowing of the field of vision of the elderly [4]. When gazing at a certain point, the ability to perceive

and grasp the surrounding things decreases. For example, the sensitivity to distance and stereo sense decreases, which will also lead to the elderly's relatively blurred perception of the boundary of different things in the field of vision.

Memory and Attention. Memory refers to the reproduction of the scenes and things experienced in people's mind, which is the basis of human understanding of the world. Everyone is born with about 1 billion brain neurons, and memory function depends on them. However, with the growth of individual age and the aging of human body, brain neurons will continue to decrease, which will inevitably lead to the decline of human memory [5]. In this age group, memory deterioration and inattention are common in the elderly. They are more likely to be attracted to other non-shopping objects in other interfaces. For instance, due to the non-touchability and complex links of online shopping, they often misselect or omit payment links in the shopping links.

Psychological Changes. The elderly in this age group are often in retirement or near retirement in China. The reasons for their psychological problems are often the change of social and family roles. Because of the change of living environment and the relative alienation of interpersonal relationship, they may face the special needs of online shopping. In shopping demand, they often show two levels of differentiation. Some of them will get a sense of achievement through shopping in the relatively low-cost products of online shopping after the change of their living environment, which is manifested by indulgence in online shopping. Others, because of their own education and other background problems, show resistance and distrust to online shopping, such as turning to their children in online shopping or never doing online shopping to prevent cheating.

2 Research Objectives and Methods

2.1 Aim and Objectives

The research aim is to improve the efficiency of online shopping for the elderly and reduce the inconvenience of design based on the feature of the changes of the elderly both in psychological and physiological functions. The objectives are to explore various inconveniences of the elderly in the online shopping platform, to analyze the underlying reasons, to provide sufficient theoretical support for the follow-up interactive design principles of shop-ping websites for the elderly, and to put forward the interactive design principles of shopping websites for the elderly.

2.2 Research Methods

This study recruited 10 elderly volunteers aged 60 to 65. Based on the research questions and referring to the previous relevant literature, observation and questioning method and semi-structured interview method were used to collect data.

Flow System in Human-Computer Interaction: This is a system consisting of a user's machine environment. For users, the main interaction channels are visual input channel and touch output channel. In this interactive process involving vision and

touch control, there is a flow system, including visual flow, operation flow, visual focus-to-contact guiding flow, and contact-to-visual focus feedback flow.

User Interviews: Interview is a survey method to understand the psychology of the interviewees through face-to-face communication between the researchers and the respondents. Its advantage is that it can accurately, deeply and effectively collect information about the attitudes and opinions of the respondents. It helps to provide a true and clear understanding of the online shopping situation of the elderly, the use of shopping websites and the operation experience of the shopping website interface.

3 Primary Study

3.1 Participants Survey

This study recruited 10 elderly people aged 60 to 65 who had online shopping experience and had at least one online shopping experience in the past three months. They participate in research as volunteers. Their basic information is shown in Table 1.

Table 1. The list of basic information about the subjects surveyed

Number	Gender	Age	Common consumption websites
1	Male	60	JD
2	Female	65	Taobao
3	Female	64	Taobao
4	Male	64	Taobao
5	Female	62	Taobao
6	Female	63	JD
7	Male	65	Tmall
8	Male	61	JD
9	Male	62	JD
10	Female	65	Taobao

3.2 Data Collection

Observation and Questioning on the Home Page of Shopping Website. Before the beginning of the research, it is necessary to explain the research process in detail to the participants, and explain the important concepts and related knowledge involved in the research. The participants were told that the main content of the test section today is the eye movement track of the home pages of three major shopping websites (Taobao, JD and Tmall). During the test, each participant had 30 s to browse the home page of the shopping website and they were required requests to follow the simple description of the blocks in the observation process from the most attractive area to the general attraction area. In the process of testing, besides the necessary guidance, researchers try to minimize language interference and prevent the impact of research results.

Before the research, we divide the home page of shopping website into blocks by visual rules (the proportion of pictures and words, spacing, color), and the number of plates is not fixed. The classification is as follows: Figs. 2, 3 and 4.

Fig. 2. Block map of home page of JD shopping website

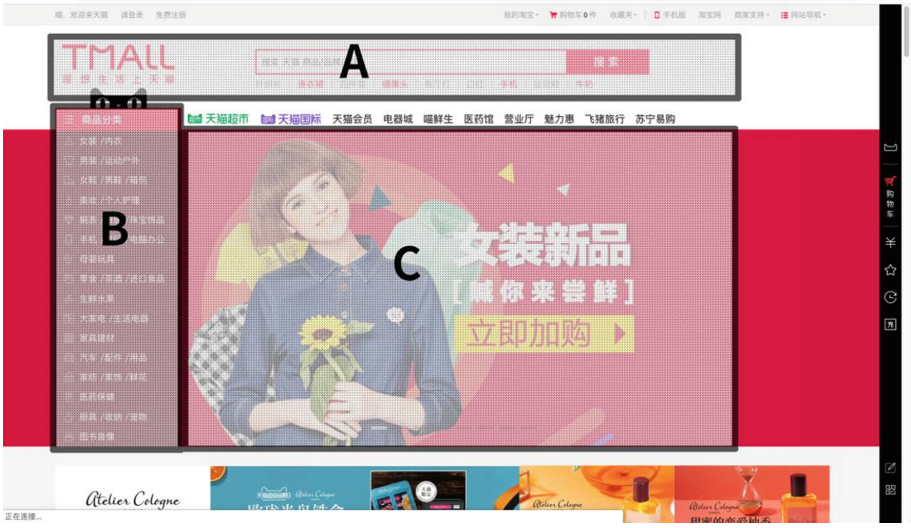

Fig. 3. Block map of home page of tmall shopping website

Fig. 4. Block map of home page of Taobao shopping website

First, the participants were told in advance to remember the visual sequence of their first visit, then the participants browsed the original home page of the shopping website for 30 s, and finally the participants were provided with their Block Map of Home Page of Shopping Website. Participants were asked to retell their visual order. Researchers keep records. This process is repeated three times to complete the test of three shopping website homepages.

In-depth Interview. The basic process of online shopping can be divided into seven steps: landing, entering product mall, selecting goods, putting in shopping cart, filling in information, selecting payment method, entering payment platform and confirming.

Because the research participants have the experience of online shopping, it is known that the basic operation of seven steps and ten research participants can be completed smoothly.

In the in-depth interview section, taking into account the psychological and thinking features of the 10 elderly people in the survey, the observation and interview process try to create a relaxed and pleasant atmosphere to alleviate the ideological pressure and nervousness of the elderly subjects. In the in-depth interviews with the elderly, the questions are mainly related to the problems encountered in the seven shopping sessions of the elderly (Table 2).

Table 2. Questions on in-depth interviews with the elderly

(1) Which websites do you often shop on? What are your main purchases?
(1) Do you have any difficulties or confusion in using shopping websites?
(2) What do you think are better and what are not enough about the usability of the interface design of these shopping websites?
(3) Do you have any suggestions on the color, font size, layout of the shopping website interface?

3.3 Analysis and Discussion

Observation and Questioning on the Home Page of Shopping Website.

A Brief Analysis of the Visual Elements of Shopping Websites.
Color part: Due to the youthfulness of the current shopping website, the saturation is relatively high. The JD page uses red and purple as the main color, and Taobao and Tmall use red and orange as the main colors. Color matching is also relatively bright, less dark.

Page layout: Tmall pages are relatively simple, horizontally divided into two parts: shopping guide bar and advertising page. Both JD and Taobao adopt three parts, which are divided into shopping guide bar/advertising page/user login. Vertically, the Taobao and JD interfaces have an ad bar at the top relative to Tmall.

Visual Flow Track of Home Pages of Three Mainstream Shopping Websites in China.
By sorting out the descriptions of the research participants, this part combs out the visual flow trajectories of the home pages of the three major mainstream shopping websites in China. It can be concluded that the analysis is as follows:

The visual order of observing JD website: 10 people are in the order of CBADEF. Three people are in the order of CBAEDF, and the other two people are in the order of CDBEAF and CBDAEF.

The visual order of observing Tmall website: The order of ten people is: CBA

The visual order of observing Taobao website is confusing: the most attractive part is D, the least attractive part is ACF (regardless of order). The rest of the BGE sequence is difficult to sort for participants.

Analysis and Conclusion.
Some simple conclusions can be drawn by sorting out the visual order:

Pictures in the middle of the page are usually the most attractive. The top part of the layout is often noticed at last, unless it is attracted by bright colors. Picture information often attracts more attention than text information.

Search boxes and login pages of websites are often overlooked because of text or lines.

The simpler the layout partition is, the larger the proportion between the plates is, and the clearer the visual flow is. Conversely, similar proportions between plates can cause visual confusion.

In-depth Interview. Among the online shopping platforms, Taobao has been the most selected. Ten research subjects all have visited Taobao because of its high quality, low price and complete variety of goods. As a branch of Taobao, Tmall has high reliability and a platform to ensure the quality of service. The most trusted one is JD Mall. Because of its fast and convenient logistics and high reliability, the research participants often buy relatively valuable or badly needed goods in JD. The reliability of shopping platform is the most important factor in the selection of 10 participants. Other shopping websites, such as Dangdang, Suning and Gome, are also occasionally selected.

In the process of using shopping websites, the difficulties of describing the participants of investigation are mainly manifested in several aspects: In the initial stage of

use, it is difficult to find the required function entry. In the process of use, the color matching of the product is difficult to identify or the font is too small to be distinguished, resulting in long use time and fatigue. On the one hand, in the checkout part, due to the distrust of security, on the other hand, due to the complicated operation, some of the payment sessions will be handed over to the children to pay.

In the last two questions, 7 participants clearly expressed their desire to simplify the information of shopping interface, eager for interactive design with clear logic, easy to find goods. Other requirements include simple operation, timely response, clear rules of graphics and text information, reasonable size of text and pictures, and balanced color distribution. The other three participants said they could adapt to the current interactive style of shopping websites, but for the elderly, they also looked forward to more suitable interactive operation of shopping websites for the elderly.

4 Results and Findings

According to the psychophysiological features of the elderly and the results of the investigation, the interactive design optimization scheme of shopping websites for the elderly is proposed from three aspects.

4.1 Information Framework

For the interactive information framework of shopping websites for the elderly. First of all, we should fully understand the needs of users, combine the physiological and psychological needs of the elderly, simplify the interface function and strengthen the system collation. In the process of investigation, the elderly shopping is often searched by two ways: Through the search box or through the guide bar into the classification area, and then choose. In combing the information framework, we should strengthen the proportion of information sorting, classification and search convenience.

For the elderly, the depth and width of each interface cannot be too much. Depth refers to the selection times made by the elderly before they want to achieve the functions they use, while width refers to the information of the options contained in a single page. Depth and breadth are contradictory to some extent. Too much breadth and depth ratio will increase the user's use burden and reduce the operation speed. Therefore, balancing the depth and breadth of information framework is a key point for designers. It is acceptable to display 4–8 items/menus and 3–4 levels in the same system. Width is more important than depth, but it does not mean that the design of depth can be ignored. For the common functions of the elderly, we can consider to advance their depth level, such as shopping cart settings, or logistics progress location, and give priority to their level.

In the current elderly shopping website, there is always a situation: By default, all functions could be understood and be used by all users. It is undeniable that online shopping is a product of the Internet era which simulates real shopping. In the process of learning and communicating with the Internet, many young people have learnt the way of network interaction, but for the elderly, websites should always have a zero-based mentality for them. In building the platform of shopping website for the elderly,

it is necessary to add the function of explaining the process and the function of timely emergency response.

4.2 Interaction Framework

Character and Pattern Selection. Language information categories (including icons and characters) should adopt the expression methods familiar to the elderly, and try to use direct and accurate product descriptions.

Principle of Repetition. In the interface structure with similar function or same category, the interface form should be consistent or similar, and the content with the same meaning should use repetitive frame structure.

Feedback System. When the user operates, the interface needs to give the user information status feedback, such as confirmation message when deleting. In addition, when the user operates incorrectly, the interface must give the feedback information of the user's current status, so as to avoid confusion and confusion for the elderly.

Location Operation. In the interactive framework, the elderly users should be given information constantly to help them determine the operation steps. For shopping, the seven steps are often not completed smoothly at one time, often repeated several of them, and ultimately completed. At the top of the shopping website, you can add a progress bar to facilitate the positioning of the elderly, such as the design of Taobao payment part (see Fig. 5).

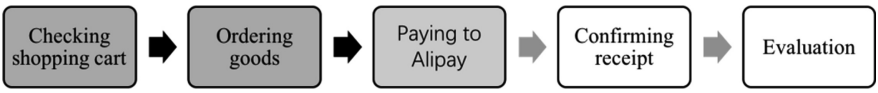

Fig. 5. Payment process of taobao shopping website (Source from: https://buy.tmall.com/order/confirm_order.htm?spm=a1z0d.6639537.0.0.undefined, 2018)

4.3 Visual Framework

Text. When using shopping websites, the text size of the webpage is generally 12px. In some cases, due to the size of the product image compression, many text sizes may be less than 12px. For the elderly, using 16px as the text reading number is more suitable for the elderly to read.

The choice of fonts should also be more square, too artistic fonts will affect the reading effect of the elderly.

Color. In the process of designing web pages for the elderly, the rational use of colors allows users to complete operations more smoothly. For example, the elderly could be dazzled by too bright colors, while the old man has a poor ability to distinguish the cool colors of blue, so we can use cool colors as the background color, and some bright warm colors can be used as the navigation information or the color of the function

buttons. And the color of the home page should change with the logic level, which can prevent the elderly from feeling uncomfortable in the process of using.

Pictures. For shopping sites, images are a significant part. The appeal of displaying products is often greater than the textual description. For the elderly, in the selection and layout of pictures, do not create too many visual centers on the same layout. We can use the real shot of the product to enhance the consumer's sense of consumer safety and fully understand the product selling point. The choice of picture color should conform to the visual features of the elderly, and the color of the text and the picture must be distinguished.

5 Conclusion

This paper investigates the current situation of online shopping for the elderly by analyzing the flow system and research method in human-computer interaction, and obtains the behavior features of the elderly in online shopping, and sorts out some problems for the elderly in using the shopping website by using stream system method and user interview method. Combined with the features of intuitiveness, easy operation and easy to understand, this paper proposes a scheme that can be referenced by the interface of the elderly shopping website to make it more close to the humanized design. The results of this study complement the gap in the user experience of the elderly on shopping websites, also provides reference for the design of shopping websites for the elderly and other design criteria for the elderly.

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References

1. Guosheng, H., Rumei, L.: An analysis of population aging, public pension expenditure and reform strategies in BRICS. Econ. Syst. Reform **5**, 56–61 (2016)
2. Jingjing, R.: A brief analysis of the development trend of "Outdoor Media + " in the mobile internet era. Art Technol. (8), 29 (2016)
3. Men, D., Hu, X., Nivala, W.C.Y., Chen, R.C.C.: A study of cognitive behavior in relation to the elderly visual experiences. In: Stephanidis, C., Antona, M. (eds.) Universal Access in Human-Computer Interaction. User and Context Diversity, UAHCI 2013. Lecture Notes in Computer Science, vol, 8010. Springer, Heidelberg (2013)
4. Lin, N., Zhe, L., Jinsong, Z.: Applying contrast sensitivity analyzer to evaluate the visual quality of cataract patients. Biomed. Eng. Clin. **13**(5), 425–430 (2009)
5. Bin, G.: Talking about the role of "memory" in vocal music teaching and learning. Art Educ. **1**, 147–148 (2009)